**Connecting Mathematical Ideas**

Teachers’ questions play a critical role in establishing the instructional environment as well as the direction of lessons (Boaler and Brodie, 2004).

Teacher Questioning Analogy (pg.36)

Surface questions don’t take kids deeper into mathematical issues; akin to walking on a path that surrounds a beautiful forest without ever stepping into the forest to look at the trees.

Questions that are more probing may not build carefully toward key concepts; akin to stepping in and out of the forest, catching glimpses of trees and flowers but not learning where they are in relation to each other or how they may navigate their way through the forest.

Questions that target key concepts and build carefully to enable students to find their way around allow kids to experience the forest fully – they walk through, looking at the trees and flowers, and they also climb some trees and look at the whole terrain, getting a sense of where they are.

The questions we ask become the pathways students walk along and that shape their experience of the terrain.

Teacher Questions from Connecting Mathematical Ideas (Boaler & Humphries, 2005, p.37)

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| Question Type | Description | Example |
| 1. Gathering information, checking for a method, leading students through a method | Want direct answer, usually right or wrong  Rehearse known facts or procedures  Enable students to state facts or procedures | What is the value of x in this equation?  How would you plot that point? |
| 1. Inserting terminology | Once ideas are under discussion, enables correct mathematical language to be used to talk about them | What is this called in math?  How would we write this correctly mathematically? |
| 1. Exploring mathematical meanings and relationships | Points to underlying mathematical relationships and meanings  Makes links between mathematical ideas | Where is the x on the diagram?  What does probability mean? |
| 1. Probing; getting students to explain their thinking | Clarifies student thinking  Enables students to elaborate their thinking for their own benefit and for the class | How did you get ten?  Can you explain your idea? |
| 1. Generating discussion | Enables other members of class to contribute and comments on ideas under discussion | Is there another opinion about this?  What did you say, Justin? |
| 1. Linking and applying | Points to relationship among mathematical ideas and mathematics and other areas of study or life | In what other situations could ou apply this?  Where else have we used this? |
| 1. Extending thinking | Extends the situation under discussion, where similar ideas may be used | Would this work with other numbers? |
| 1. Orienting and focusing | Helps students focus on key elements or aspects of the situation in order to enable problem solving | What is the problem asking you?  What is important about this? |
| 1. Establishing context | Talks about issues outside of math in order to enable links to be made with mathematics at a later point | What is the lottery?  How old do you have to be to play the lottery? |

95% of questions in traditional classrooms are evaluative (type 1)

Probing questions, support justification & reasoning, are common in reform classrooms (type 4)

Exploring math meaning and relationships are the most important yet rarely used question type (type 3)